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WHITEHOUSE SUBMITS GENERAL REPORT ON CONCRETE PAVING

City Engineer Advises No Less Than Half-Foot Thickness for City Streets

Recommending a thickness of not less than six inches for concrete paving in any part of the city, and advising the use of sand that may be secured here without importation from the coast, Engineer L. M. Whitehouse last Friday submitted a detailed report on concrete roads to the supervisors.

He suggests an experimental concrete pavement on one of the heavy traffic districts in the business section. The report, which was filed with the road committee, is in part as follows:

Materials.
"The materials available in Honolulu for the making of concrete are: (1) For the fine aggregate, imported Portland cement, coral beach sand, commonly called 'Waianae' sand, and crushed rock sand passing a quarter-inch screen; (2) For the coarse aggregate, crushed lava rock.

"Several brands of Portland cement are used in Honolulu, all of which meet the standard specifications of the American Society of Testing Materials. No shipment of cement, however, should be allowed to go into any structure, street pavement or other wise, before samples of the cement have been subjected to the standard tests.

"Waianae' sand as a constituent in the fine aggregate has been the subject of much argument. The engineers in charge of the construction of the Pearl Harbor dry dock eliminated this material from use in concrete on account of its chemical instability under the conditions prevailing there. They used imported Puget Sound sand with No. 4 crushed rock sand in the proportion of 1:2.

"The crushed rock available is thoroughly satisfactory and can be obtained free from the so-called 'puka' rock, or disintegrated rock. It is a well established fact that the fine aggregate and not the crushed rock is the controlling factor in the strength of concrete.

Tests.
"There have been many tests made in Honolulu on the strength of concrete composed of the materials available here. Thorough tests were made by the navy engineers before commencing the construction of the Pearl Harbor dry dock. The College of Hawaii testing laboratory has made numerous tests on the strength of concrete composed of varying proportions of cement, sand and crushed rock. Three different sands were tested: imported Puget Sound sand, 'Waianae' sand, and crushed rock sand. The results of the College of Hawaii experiments show that:

"(1) 'Waianae' coral sand gives the same strength as the imported Puget Sound siliceous sand. Although no abrasion tests were made it is reasonable to assume that the silica sand would have proved far superior to the softer coral sand.

"The resistance to abrasion is one of the chief requirements of a concrete pavement if used with or without a bituminous coating. An examination of the samples of Waianae sand and standard Ottawa silica sand submitted with this report will show conclusively the superiority of silica sand to coral sand in resisting abrasion. The silica sand is very firm and hard while the coral sand is relatively soft.

"(2) Probably the best combination of materials is one (1) part cement, two (2) to two and one-half (2 1/2) parts of sand and four (4) parts of crushed rock. The sand is composed of half coral sand and half crushed rock sand. It was found in these experiments that the above combination of the two sands gave greater strength than either one used entirely alone. The addition of coral sand to the crushed rock sand gives a concrete which is much easier to handle and which gives a better appearance to the completed work.

"Many theories have been developed as to the requisite thickness of concrete pavements, all of which differ in the original assumptions and in the results obtained. The only conclusive proof as to thickness is based on actual practice. It has been shown by tests made by the California State Highway Commission that a four (4) inch slab of 1:2:1.2-2 concrete will support the passing of a ten (10) tons road roller over a trench two feet wide, without noticeable deflection. However, when the roller was stopped, so that the load of the rear wheels was concentrated at the edge of the trench, failure took place, due to insufficient area to carry the shear load.

"Those who advocate a four (4) inch thickness are assuming a perfect or ideal subgrade which takes the load of traffic without causing anything but compressive stresses in the concrete. As a matter of fact no subgrade is altogether perfect and the concrete will undoubtedly be called upon to bridge certain weaknesses in the subgrade, thereby producing tensile and shearing strains which a thickness of four (4) inches will not be able to resist without ultimate failure. It may be argued from California State Highway practice that four (4) inches thickness is enough. This thickness has not been open to traffic for a period of time long enough to establish its sufficiency. It is not fair to assume that the requirements of a city street are similar to those of a country highway.

"The conditions as to traffic and subgrade are widely different in both cases. In a city the traffic is much heavier and the subgrade, at least in Honolulu, is being constantly disturbed by excavation for pipelines, etc. It is also a fact that the improvement of any street attracts a greater volume of traffic than it would have to carry in its unimproved condition. Four (4) inches of concrete, as a wearing surface on a well compacted macadam would probably be entirely sat-

isfactory, but to specify this thickness for a new subgrade would make its permanence questionable.

"(1) It is not necessary to import sand for making concrete roadway pavements, provided the pavement is always protected by a thin bituminous wearing surface.

"(2) The mixture of materials to be recommended should be one (1) part cement, two (2) to two and one-half (2 1/2) parts sand, and four (4) parts crushed rock. The sand to be composed of equal parts 'Waianae' sand and crushed rock sand. The crushed rock to consist of No. 2 and No. 3 properly proportioned.

"(3) The minimum thickness of the pavement to be recommended for any part of the city is six (6) inches. This thickness will be a guarantee of permanence, other things being equal, and contractors might reasonably be expected to furnish a guarantee based on this thickness for at least five (5) years. It will be noted that the Dowsett Company, Limited, has contracted for the construction of a six (6) inch concrete pavement for a section of road in Nuuanu valley which will have the lightest possible variety of traffic.

"(4) Transverse expansion joints one quarter (1/4) of an inch wide should be provided at distances of about twenty-five (25) feet apart. This is absolutely necessary if the work is not completely cured, but should the concrete paving be completely cured these joints may be placed at intervals of from 50 to 100 feet.

"(5) A thin bituminous coating should be placed on all concrete pavement not only to protect the surface from abrasion but also to remove the glare which would otherwise be present.

"(6) An experimental section of road, under heavy traffic should be improved with the various kinds of pavements available as a practical experiment. Until such a section of concrete road is constructed on one of our many heavy traffic streets the question as to what is the best method of constructing an efficient and durable concrete pavement is bound to be a matter of unprofitable argument between the advocates of the various types of concrete pavement construction."

ACID STOMACHS ARE DANGEROUS

Nine-tenths of All Stomach Trouble
Said to Be Due to Acidity.

A Physician's Advice on Cause and Cure.

A famous physician whose successful researches into the cause and cure of stomach and intestinal diseases have earned for him an international reputation, said in the course of a recent lecture that nearly all intestinal troubles, as well as many diseases of the vital organs, were directly traceable to a deranged condition of the stomach which in turn was due nine times out of ten to excessive acidity, commonly termed sour stomach or heartburn, which not only irritated and inflamed the delicate lining of the stomach, but also set up gastritis and stomach ulcers. It is interesting to note that he condemns the use of patent medicines as well as of medical treatment for the stomach, stating that he and his colleagues have secured remarkable results by the use of ordinary disordered magnesia, which, by neutralizing the acidity of the food, removes the source of the trouble. He contends that it is as foolish to treat the stomach itself as it would be for a man who stepped on a tack to rub liniment on the foot without first removing the tack. Remove the tack and the foot will heal itself—neutralize the acid and stomach troubles will disappear. Irritating medicines and medical treatments are useless, so long as the contents of the stomach remain acid; remove the acidity, and there will be no need for medicine—the inflamed lining of the stomach will then heal itself. Sufferers from acidity, sour stomach or heartburn should get a small bottle of disordered magnesia from their druggist, and take a teaspoonful in a quarter of a glass of hot or cold water after meals, repeating in fifteen minutes, if necessary, this being the dose which the doctor has found most efficacious in all cases. For sale by Benson, Smith & Co., Chambers Drug Co. and Hollister Co.—Advertisement.

CANADA TO EXTEND ITS SHELL MAKING

OTTAWA, Canada.—Announcement was made recently that an ambitious munitions plan is under way in Canada by which financial houses are to be called upon to join Canadian factories on active service. It is proposed to extend tremendously the Canadian capacity for producing projectiles, to have a very substantial proportion of the Russian, French and British shell orders filled in Canada and to have the business financed by the banking houses and other financial institutions of the dominion.

The plan constitutes a radical departure from that which has heretofore prevailed. It will mean that instead of borrowing from Great Britain, Canada will make advances of credit and funds to England.

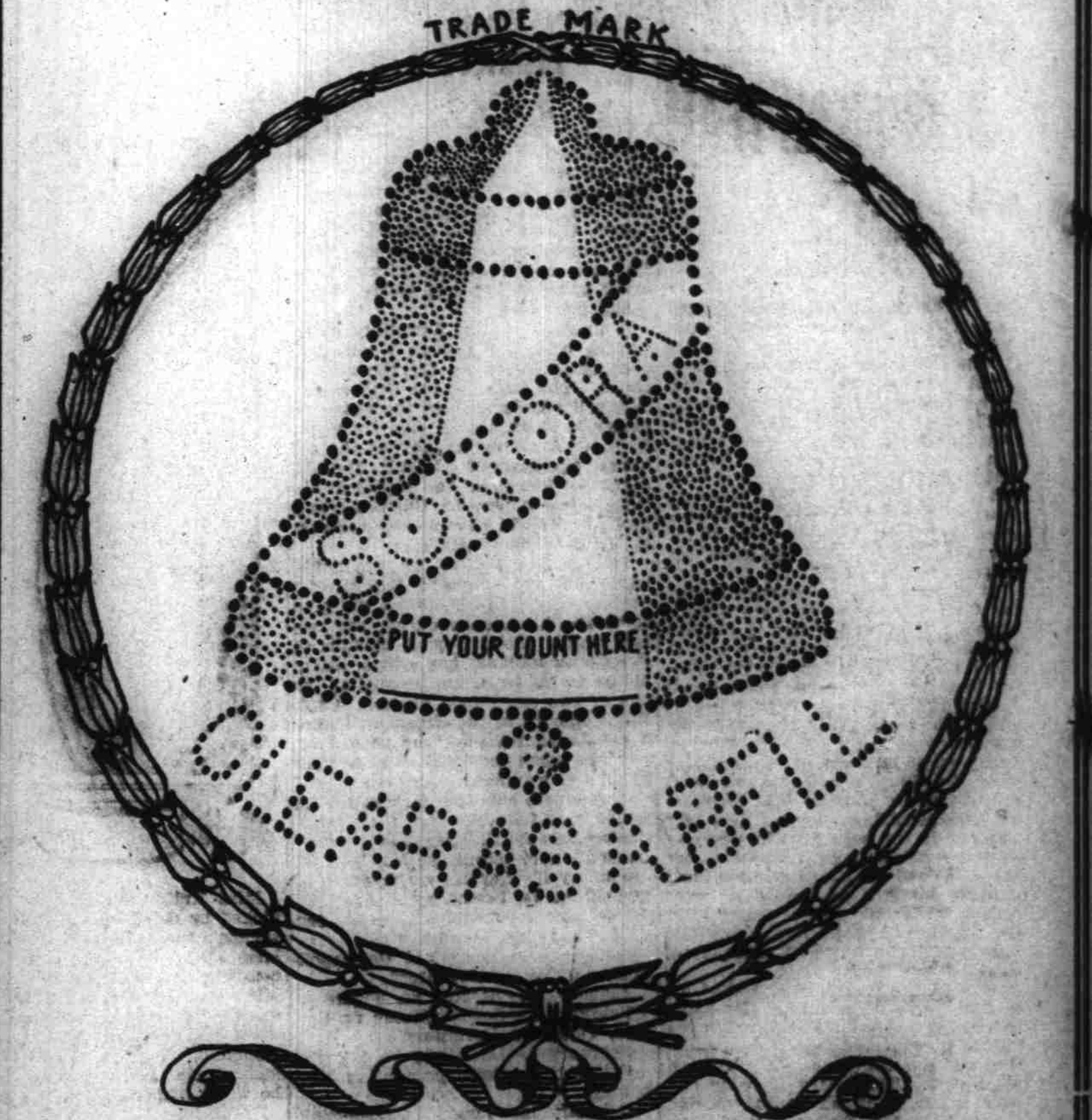
Shell orders which have been filled or which are being filled in Canada have reached the total of \$500,000,000. More than 250 manufacturing firms are engaged upon the work. It is estimated that Canadian firms have installed more than \$35,000,000 worth of special machinery.

William Edward Bemis, vice-president and director of the Standard Oil Company of New York, died at Port Jervis. He was 51 years old.

A New Year's Gift For You

The Star-Bulletin will present some one of its many readers a beautiful Sonora Phonograph, Mahogany finish, net price \$35.00.

Absolutely Free on January 6, 1916



THE SONORA PHONOGRAPH

was the only instrument given a perfect score of 100% for tone quality at the Panama-Pacific Exposition, San Francisco. This instrument plays all makes of disc records, Victor, Columbia, Edison and Pathe, with one sound-box, and is provided with a jewel needle, making changing of needles unnecessary.

A tone modifier is its latest attachment, making it possible to graduate the volume from the loudest to the softest volume while the record is playing. The motor is extra strong, allowing several records to be played with one winding. This instrument is on exhibition at the Hawaiian Phonograph Supply Company, 150 South Beretania Street, and will be demonstrated any time during the contest.

Count the Dots

This beautiful prize will be awarded to the person giving the correct total number, or the nearest correct total number of dots contained in the above picture for the entire period from December 7, 1915, to December 31, 1915, inclusive.

All the dots inside of the wreath must be counted each day, as the number of dots will be changed daily. Clip the bell from the Star-Bulletin each day, count the dots and insert your count in the space provided on rim of bell, then write your name and address plainly on the lines below, place clipping in envelope, seal it up and deliver to Hawaiian Phonograph Supply Company, 150 South Beretania Street, either by mail or in person. The contest will close with the issue of December 31, 1915, of the Star-Bulletin, and the last counts must be delivered at the Hawaiian Phonograph Supply Company, 150 South Beretania Street, not later than 9 a. m., Thursday, January 6, 1916, at which time the prize will be awarded.

Contestants may send in their clippings daily or weekly, or all together after the contest closes December 31.

Back copies may be procured at the Star-Bulletin Office at any time.

Your Name.....

Address.....

No employee of the Star-Bulletin or the Hawaiian Phonograph Supply Company, nor members of their families, will be allowed to enter this contest.

NOBLEWOMEN SENT TO BEGUILE SWISS

LONDON, England.—The Morning Post's Bern correspondent wires that, following Prince Buelow's arrival at Lucerne, there arrived a galaxy of rich Hungarian, Austrian and German noblewomen, who established themselves at first class hotels in judiciously selected places in German and French Switzerland. These ladies are exceedingly hospitable and amiable to any Swiss, who will accept their invitations to tea or dinner parties, paying them highly flattering attentions. This is an ingenious way of conducting propaganda.

All these ladies have evidently received careful preliminary instruction as to what to say and what not, for all say the same things, and their chief topic is that the peace congress must be held in Bern and that the only person who opposes its being held there is the British minister.

Paul Harney, well known as an artist, died at Mount St. Joseph hospital in St. Louis, Mo., aged 60 years.

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